The Hot Fuel Examination Facility is the largest hot cell dedicated to radioactive material research at Idaho National Laboratory.

Hot Fuel Examination Facility

Post-irradiation Examination of Fuels and Materials

General Information

The Hot Fuel Examination Facility (HFEF) is the flagship facility for conducting post-irradiation evaluations of fuels and materials at Idaho National Laboratory (INL). Located at the Materials and Fuels Complex, HFEF is a national research asset with the largest inert atmosphere hot cell dedicated to nuclear materials research in the U.S.

HFEF provides the ability to remotely handle and perform detailed nondestructive and destructive examination of highly irradiated fuel and material samples. Its argon-atmosphere hot cell, labs, and special equipment handle a variety of fuel forms, including tiny particles, four-foot research reactor plates, and full-sized commercial rods. HFEF supports INL's mission of research and development of safer and more efficient fuel designs.

Key Capabilities:

- HFEF has two large, shielded hot cells. The main cell, which is 70 by 30 feet, is stainless steel-lined. It's fitted with two 5-ton cranes and 15 workstations, each with a 4-foot-thick window of oil-filled glass and a pair of remote manipulators. The second hot cell is an air cell used to decontaminate materials and equipment.
- The Neutron Radiography Reactor is a 300 kW TRIGA reactor in the basement of HFEF. It is equipped with two beam tubes and two separate radiography stations for neutron radiography of small test components.
- Precision gamma scanning allows scientists to precisely determine the location of radioactive elements in fuel and material samples.
- Laser puncture and gas collection with the gas assay sample and recharge (GASR) from fuel samples helps researchers gain needed information on fission gas and helium release.
- The Fuel Accident Condition Simulator (FACS) furnace provides the capability to test fuel and material samples under worst-case scenarios involving temperatures of up to 2,000°C for extended periods of time. This allows scientists to understand performance and improve the safety of fuel designs.

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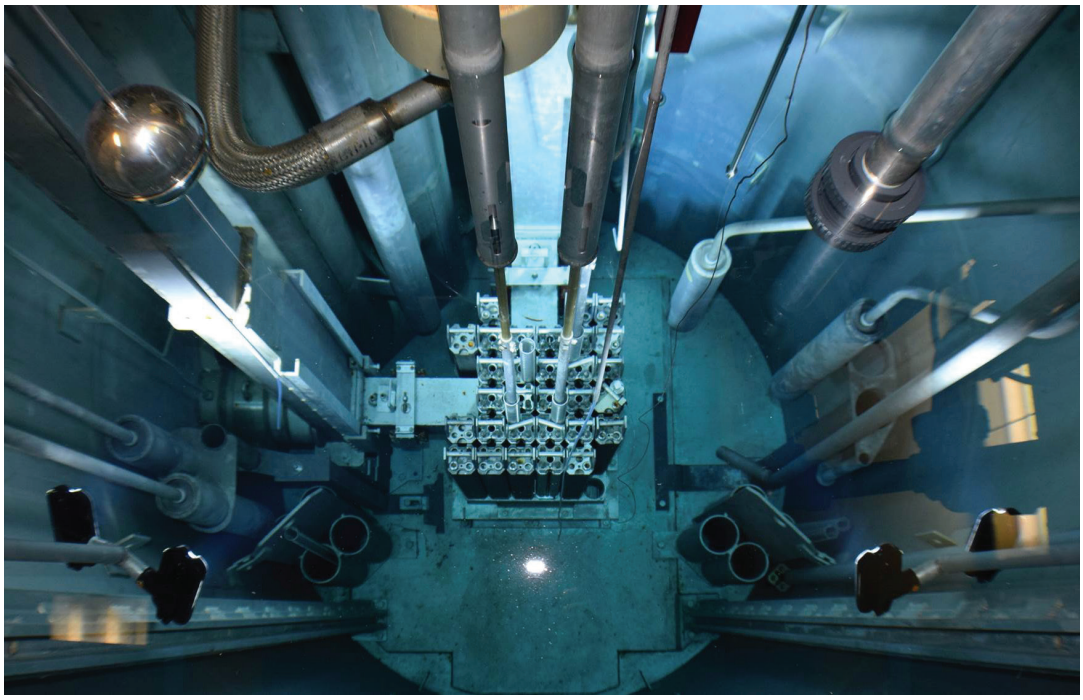
Hot Fuel Examination Facility

Technical Information



The HFEF TRIGA reactor, known as NRAD, enables neutron-radiography irradiations to verify materials behaviors.

The Hot Fuel Examination Facility (HFEF) is a multi-program hot cell facility. There are two adjacent shielded hot cells (the main cell and decontamination cell), a shielded metallography box, an unshielded hot repair area, and a waste-characterization area. HFEF provides shielding and containment for remote examination, processing, and handling of highly radioactive and TRU-bearing materials in its argon-atmosphere hot cells, unshielded labs, support areas and special equipment for handling, examining, and testing of highly radioactive materials.

Basic Capabilities:

- Nondestructive and destructive post-irradiation examination of irradiated samples in two large, heavily shielded hot cells
  - Machining and disassembly of fuel and material experiments
  - Neutron radiography/neutron tomography
  - Visual examination and dimensional examination
  - Gamma scanning/gamma tomography
  - Fission-gas-release measurement
  - Sample preparation for metallography, chemical and isotopic analysis, and optical microscopy
- Mechanical testing of irradiated fuels and materials
- Bench-scale electrochemical separations research
- Handling and loading facilities capable of receiving large shipping casks and fuel assemblies up to 13 feet long
- Furnaces for simulating accident conditions at temperatures up to 2,000° C for extended periods of time

Key Instruments:

Nondestructive instruments include:

- 300 kW TRIGA Neutron Radiography Reactor (NRAD)
- Eddy Current probe for measurement of oxide thickness
- Precision gross and isotopic gamma spectrometer
- Element contact profilometer

Destructive instruments include:

- Laser puncture gas collection and analysis system
- Fuel Accident Condition Simulator (FACS) furnace
- Metal waste form furnace

For more information

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